

Essays

The long and the short of abbreviations

Tom Lang

Tom Lang Communications and Training International; ORCID Number: 0000-0002-7482-7727; tomlangcom@aol.com

DOI: 10.20316/ESE.2019.45.18018

Abstract: Abbreviations—and their related shortenings, contractions, acronyms, initialisms, blendings, and mnemonic devices—are far more interesting than they first appear. They are also a mixed blessing, saving space and time but also increasing the chances of a text being not understood or, worse, being misunderstood. Here, I ignore some important aspects of abbreviations (capitalization, punctuation, preceding articles, plurals, and possessives) and instead describe their history, uses, and implications and summarize the most common rules and recommendations for their use in scientific publications.

Keywords: abbreviation, acronym, initialism

Introduction

There are only 17,000 three-letter acronyms.

Paul Bouton¹

An **abbreviation** is a shortened form of a word or phrase used to make writing easier, reading faster, and the text shorter, by reducing the need to repeat the longer word or phrase.²⁻⁷ Abbreviations have been used for at least 5000 years to optimize the trade-off between convenience and courtesy. That is, the more information we leave out for our own convenience when we write, the more we risk the discourtesy of confusing readers.^{7,8} Skillfully used, abbreviations can provide both convenience and courtesy. However, learning how to abbreviate successfully is not always easy: the *AMA Manual of Style* has an 88-page chapter and 98 index entries on abbreviations.⁵ Fortunately, the basic rules for using abbreviations are widely accepted, if not always applied (Table 1). Apparently, no rule requires words or phrases to be abbreviated.⁹

In this article, I describe some issues with abbreviations and review the rules and advice for using them. Space prevents addressing other important issues, such as capitalization (ED vs. ed [emergency department vs. edition]), punctuation (I.V. vs. IV [intravenous vs. Roman numeral 4]), the use of articles (*an* HIV test vs. *a* HIPPA directive), and plurals and possessives ('ROS are' and 'ROS's' [reactive oxygen species]).³

Forms of Abbreviations

Our efforts to avoid spelling entire words have been long-standing and creative.

Shortenings (truncations) usually consist of the first few letters of a word (poliomyelitis becomes polio). If the short form is still regarded as an abbreviation, it may be followed by a period (professor becomes prof.). Less common are

shortenings (clippings) that consist of the last few letters of a word (alchemist becomes chemist).³

Contractions (suspension abbreviations⁶) are words in which certain letters have been omitted (Doctor becomes Dr.) or in which omitted letters are indicated by an apostrophe (cannot becomes can't).^{6,10}

Initialisms (sigla⁶) are formed from the first letter of words expressed as a longer name or phrase and that are usually pronounced as letters (obstetrics and gynecology becomes OBGYN).⁵ OK—the most commonly used word on the planet—most likely came from 'Oll Korrekt,' a word coined during a fad of comical misspellings that began in Boston in 1838, although several other less-plausible origins have been proposed.¹¹ Today, many Internet and texting slang abbreviations are initialisms (LOL for 'laughing out loud').²

Acronyms are initialisms (usually written in capital letters) pronounced as words rather than as letters ('seasonal affective disorder' becomes SAD) or that have become accepted as words ('Medical Literature Analysis and Retrieval System Online' becomes MEDLINE) or as words formed from parts of several words ('CONSolidated Standards Of Reporting Trials' becomes CONSORT).^{2,3,7,9,12} Redundant acronyms (or redundonyms) have duplicated elements (in 'the HIV virus,' the V for virus is followed by the word virus).¹³ Unfortunately, there are even second-order abbreviations that include other abbreviations: RBD is short for 'REM Sleep Behavioral Disorder,' where REM is the abbreviation for 'random-eye movement.'

Blendings (portmanteaus, literally, 'suitcases') are words formed from two or more other words: endorphin is a blend of endogenous and morphine; vitamin, of vita and amine. Finally, mnemonic devices, which sometimes look like abbreviations but aren't, are letters or words used as memory aids; sprains are treated with RICE (rest, ice, compression, and elevation).

An Abbreviated History of Abbreviations

The **acrophonic principle** is the practice of making the phonetic value of a symbol the first letter of the name of that symbol: the letter 'm' is a shortened form of its Phoenician pronunciation, mem.¹⁴ Acronyms and initialisms reflect this principle:¹⁴ coronary artery bypass grafting becomes CABG (pronounced 'cabbage'); blood pressure becomes BP.

Words or phrases have long been shortened because the medium of communication imposes space or time considerations. The ancient Egyptians abbreviated the hieroglyphic images on murals to form a cursive script, hieratic, for writing on papyrus.¹⁴ The Romans used

abbreviations on their coins and often replaced entire words with single letters or symbols when carving in stone. Such abbreviations were so prevalent and confusing that Emperor Justinian passed a law regulating their use.⁸ Early Christians used the Greek word *ichthys* (fish) and its image as an acronym for *Iēsous Christos, Theou Huios, Sōtēr* (Jesus Christ, God's son, Savior).¹²

In Medieval Europe, the price of parchment and the time needed to copy books led to a highly abbreviated style of writing.¹⁵ Old English also had many abbreviations: 'and' was written as '&' (from the Latin 'et,' meaning 'and' as in *et cetera*, or 'and the rest').^{2,8} In fact, medieval manuscripts contain so many abbreviations that an entire dictionary is devoted to them.⁸ In the United States, the telegraph led to abbreviations such as POTUS (the President of the United States).¹² Government and military abbreviations proliferated during WWII¹² ('general purpose vehicle' became JEEP), and of course, since the mid 1990s, texting has give us @TEOTD ('at the end of the day').

Uses of Abbreviations

Abbreviations mean that three-dimensional, pulsed-wave Doppler transesophageal echocardiography can—fortunately—be shortened to TEE. However, in addition to saving time and space,^{2,7,9} abbreviations can also be used when they are more widely known than what they stand for:³ CAPTCHA is more familiar than Completely Automated Public Turing test to tell Computers and Humans Apart. (Yes, it's for real.)

Because their meanings are sometimes not apparent, abbreviations can also become codes that separate in-groups who know them from out-groups who do not.^{7,15} In WWII, to confuse censors reading their mail, soldiers and their sweethearts communicated with abbreviations that were rather, er, naughty: N.O.R.W.I.C.H., meaning '(k)Nickers Off Ready When I Come Home,' or C.H.I.N.A., meaning 'Come Home I'm Naked Already.'¹⁶ The point being that the extensive use of abbreviations can discourage readers in one discipline from reading articles in other disciplines.⁷

Increasingly, clinical trials are given names to be abbreviated (MRFIT for Multiple Risk Factor Intervention Trial), which actually makes a difference in the rank of the publishing journal and the number of citations to the trial: names with positive connotations (SMART, ASPIRE) do better than those with negative connotations (OUCH, BEWARE).^{17,18} In addition, the connotation of the name affects patient accrual. Who wants to say they volunteered for the DIPSTICK study?¹⁷

Sometimes, the abbreviation is still too long to be comfortable: left-ventricular, end-diastolic posterior wall thickness, an echocardiographic measure of the heart, is abbreviated LVPWT, which we probably won't read letter-by-letter but will simply remember as a group of letters with a particular meaning. The longest abbreviation appears to be ADCOMSUBORDCOMPHEIBSPAC, a 22-letter-long United States Navy term for the 69-character-long Administrative Command, Amphibious Forces, Pacific Fleet Subordinate Command.

Superfluous abbreviations also don't help. The abbreviations HD and OS have the same word count as high-dose and osteosarcoma, respectively, and both have several plausible meanings in the same context. Because the spelled-out terms are unambiguous and don't increase the word count, they needn't be abbreviated.

Common Problems with Abbreviations

The most common problem is that **abbreviations are undefined** and therefore not understood.^{5,7}

A second problem is that otherwise **common but undefined abbreviations can be ambiguous**. Even in the same context, some abbreviations can have several plausible meanings (Table 2).⁵

A third problem is that **readers can't find the definition**. In shorter documents, defining the abbreviation at first mention can be sufficient. But in longer documents, or when many abbreviations are used in different parts of the text, trying to find the definition can be tedious, time-consuming, and unsuccessful.¹⁵

A fourth problem occurs **when authors create their own abbreviations**; for example, by abbreviating the names of experimental groups: PNDWH (a second-order abbreviation meaning people newly diagnosed with HIV). Although not even initialisms, labels for experimental groups, such as A, B, and C, force readers to learn the code to understand the text. Descriptive terms, such as responders, nonresponders, and controls are preferred.

A fifth problem is that, even if they are familiar, **too many abbreviations in a sentence** (a condition that has been called 'abbrevobabble'¹⁵) can be annoying and confusing.⁵ Consider: 'The NHLBI-funded CHAART study of HEU children found that in utero exposure to ARVs was associated with changes in LVEF, LV contractility, and ST/PW ratio at age 2 years.'

A sixth problem is **creating a name or phrase without considering how it will be abbreviated**—which it inevitably will be—and that can have embarrassing implications.¹⁹ Cases in point: South Lake Union Trolley, Antonin Scalia School Of Law, Center for Undergraduate Nurse Training, and Duke University Marching Band.

A seventh problem is **abbreviations that are misunderstood**.^{10,17} In one study of 643,000 medication errors, 30,000 (4.7%) were attributable to abbreviations.²⁰ For example, q1d (daily) was mistaken for q.i.d. (four times a day).¹⁰ The meanings of an additional 12,000 abbreviations could not be determined.²⁰ Some of these abbreviations were likely informal but often informative, if sometimes insensitive, clinical notes. Sometimes, a newborn is technically healthy but doesn't look 'normal' and so is flagged as an FLK (funny looking kid). However, it may be OK to be an FLK if you come from FLPs.

The skillful use of abbreviations requires judgment, which should be informed by knowledge of their strengths and weaknesses. Much depends on the assumptions about readers, the number and location of abbreviations, and how often they are used. The best advice? Put courtesy before convenience.

Table 1. Common rules for using abbreviations**When to use abbreviations**

- When possible, use a shortening (eg once defined, ‘Joint Statement on Pain Management in End-of-Life Care’ can be shortened to the ‘Joint Statement’ or even ‘Statement’).
- Determine whether the publisher allows or prohibits certain abbreviations.^{5,9}
- Use abbreviations only if their meaning is clear,^{4,5} they reduce the word count, and they avoid repetitions.^{4-7,9}
- Use abbreviations sparingly.^{5,7,9}
- Use only established abbreviations.^{5,6,9}
- Use abbreviations only when they appear often enough to be useful.^{4,6}

When to define abbreviations

- Define abbreviations in parentheses at first mention, unless they are so common that a definition is unnecessary.³⁻⁵
- Don’t define an abbreviation in a heading.^{5,9}
- If the abbreviation is more recognizable than its expanded form, it can be put first: NSAID (nonsteroidal anti-inflammatory drug). If it less recognizable, define it first: continuous positive airway pressure (CPAP).³
- Once defined, use the abbreviation throughout the rest of the text,⁴ except to begin a sentence or in figures or tables.^{6,9}
- Define abbreviations in figure captions and table titles.⁵
- For documents that are long or have several abbreviations, list them at the beginning, if the format allows.^{5,6}

When not to use abbreviations

- Don’t use abbreviations in titles and headings unless they are so well known that they will not be misunderstood.^{4,5,9} (Curiously, the American Chemical Society’s *ACS Style Guide* advises writers to ‘avoid abbreviations in the title of a paper.’ But apparently not in book titles.⁷)
- Don’t use an abbreviation as the only term in a heading.⁵
- Don’t create abbreviations unique to a specific document.⁵
- Don’t begin a sentence with an abbreviation.^{4,5,6} However, this rule is not practical in some topics, such as genetics.⁵

Table 2. Possible meanings and potential misunderstandings for the abbreviation UA and its variants

Medicine	Other contexts
ulnar artery	U (U alpha: a term in topography)
ultrasonic arteriography	u/a (under agreement)
umbilical artery	U/A upon arrival
unattended	unauthorised absence
undifferentiated arthritis	Under Armour (clothing brand)
unicystic ameloblastoma	underaged
unmeasured anions	unit administer (military)
unstable angina	United Airlines
upper airway	United Artists (film studio)
upper arm	University of Antwerp (and many others)
uric acid	unlimited access
urinalysis	unmanned aircraft
urinary albumin	unnecessary acronym (!)
urine aldosterone	uranyl acetate (a chemical)
ursolic acid	urban area
uterine activity	user agreement
uterine artery	µA (microampere)
uterine aspiration	.ua (Internet country code for Ukraine)

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The values and challenges of 'openness' in addressing the reproducibility crisis and regaining public trust in social sciences and humanities

Manh-Tung Ho, Quan-Hoang Vuong

Centre for Interdisciplinary Social Research, Phenikaa

University, Hanoi, Vietnam

Faculty of Economics and Finance, Phenikaa University,

Hanoi, Vietnam; hoang.vuongquan@phenikaa-uni.edu.vn

DOI: 10.20316/ESE.2019.45.17021

The quality of published research in the social sciences and humanities has made many, such as Taagepera, reconsider the plausibility of obtained results.¹ A typical example is the mysterious Critical Minimum Positivity Ratio 2.9013, published by Fredrickson and Losada in 2005.² The ratio had once been a famous, greatly admired, psychological "constant" until it was shown by Brown, Sokal, and Friedman (2013) to be an unfounded, arbitrary and meaningless number.³ In the following years, the reproducibility crisis in psychological sciences has induced waves of harsh criticisms and made both academics and the public cautious of a wide range of results also outside psychology,⁴ including the social sciences and humanities.⁵ A study by Camerer *et al.* (2016) found that primary findings of 11 out of 18 experimental studies in economics were replicated,⁶ while a more recent paper by Chang and Li (2018) showed that less than half of 67 studies' findings were reproducible.⁷ In political science, Dafoe (2013) showed how the lack of replication files postponed the advancement of the field for three years in a recent famous case;⁸ in 2015, a study of how canvassers can sway voters' opinions on gay marriage was later retracted due to data fabrication.⁹ With these examples around, it is not surprising that in a 2016 *Nature's* survey of 1,576 scientists, 90% agreed that there was a reproducibility crisis.¹⁰ Even the quiet world of armchair philosophers has become less and less dependent on conventional *a priori* methods¹¹ and gradually embraced the idea of data gathering and evidence-based reasoning.¹²

Given that the social sciences and humanities are facing two major problems, one concerning reproducibility and the other public trust, this essay suggests that increasing openness through open data, open peer review, and open community dialogue could offer some solutions. Not only would the openness in academic research contribute to solving the plausibility problem but it would also help raise the overall public trust in the field.

Values and challenges of open data

As Munafo *et al* (2017) pointed out, new scientific results rely on the ability to observe unexpected patterns in data.¹³ Making the underlying data open to everybody is thus a modern way of persuading both scientists across disciplines and the public about the plausibility of the results.

Open data could increase the trust that society has in social sciences research, and it is also good for individual